The image shows the front cover of a spiral-bound notebook. The cover is a light beige or cream color with a subtle, mottled texture. A silver-colored metal spiral binding is visible along the left edge. The text is centered on the cover in a bold, dark brown, sans-serif font.

# **SOIL REMEDIATION STANDARDS**

## **INTRODUCTION AND OVERVIEW**

# **SOIL REMEDIATION STANDARDS LEGISLATIVE HISTORY**

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**✓ P.L. 1993 c.139 (S-1070)**

**▶ “HAZARDOUS SITE DISCHARGE  
REMEDATION ACT”**

**✓ P.L. 1997 c.278 (S-39)**

**▶ “BROWNFIELD AND CONTAMINATED SITE  
REMEDATION ACT”**

**✓ NEW JERSEY STATUTES ANNOTATED  
REFERENCE - NJSA 58:10B-12**

# SOIL REMEDIATION STANDARDS LEGISLATIVE REQUIREMENTS

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## ✓ REMEDIATION STANDARDS TO BE RISK BASED

### ▶ STATED RISK MANAGEMENT FACTORS

- $1 \times 10^{-6}$  FOR CARCINOGENS
- HQ = 1 FOR NON-CARCINOGENS

### ▶ GENERALLY ACCEPTED AND PEER REVIEWED SCIENTIFIC EVIDENCE OR METHODOLOGIES

### ▶ REASONABLE ASSUMPTIONS OF EXPOSURE SCENARIOS

# SOIL REMEDIATION STANDARDS LEGISLATIVE REQUIREMENTS

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## ✓ REMEDIATION STANDARDS TO BE RISK BASED

- ▶ AVOID THE USE OF REDUNDANT CONSERVATIVE ASSUMPTIONS (MAKE USE OF EXPOSURE ASSESSMENT GUIDANCE DEVELOPED BY USEPA)
- ▶ CONSIDER AND UTILIZE TOXICOLOGICAL INFORMATION FROM THE USEPA IRIS DATABASE (IN THE ABSENCE OF OF OTHER STANDARDS BASED OR DEVELOPED BY DEP AND USEPA)

# **SOIL REMEDIATION STANDARDS LEGISLATIVE REQUIREMENTS**

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- ✓ DEVELOPMENT OF RESIDENTIAL AND NON-RESIDENTIAL SOIL REMEDIATION STANDARDS**
- ✓ DEVELOPMENT OF SOIL REMEDIATION STANDARDS THAT ARE PROTECTIVE OF GROUND WATER AND SURFACE WATER**
- ✓ ESTABLISH SOIL REMEDIATION STANDARDS AS NUMERIC OR NARRATIVE STANDARDS**

# **SOIL REMEDIATION STANDARDS LEGISLATIVE REQUIREMENTS**

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- ✓ **STANDARDS TO BE CONTAMINANT SPECIFIC  
(NO CUMULATIVE EFFECTS OF MORE THAN ONE  
CONTAMINANT)**
- ✓ **PROVISION FOR ALTERNATIVE SOIL  
REMEDICATION STANDARDS BASED UPON SITE  
SPECIFIC FACTORS**

# SOIL REMEDIATION STANDARDS LEGISLATIVE REQUIREMENTS

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- ✓ UNTIL SOIL REMEDIATION STANDARDS ARE ADOPTED, STANDARDS CAN BE DEVELOPED/APPLIED ON A SITE SPECIFIC BASIS
- ✓ NO ECOLOGICAL BASED STANDARDS CAN BE PROPOSED OR ADOPTED UNTIL THE ENVIRONMENT ADVISORY TASK FORCE COMPLETES IT WORK.
- ✓ HOWEVER, ECOLOGICAL BASED STANDARDS CAN BE DEVELOPED/APPLIED OF A SITE SPECIFIC BASIS

# **SOIL REMEDIATION STANDARDS PLANNED DEVELOPMENT ACTIVITY**

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- ✓ INTERESTED PARTY REVIEW - INTERNAL**
- ✓ INTERESTED PARTY REVIEW - EXTERNAL**
- ✓ DEVELOPMENT OF RULE TEXT**
- ✓ FORMAL RULE PROPOSAL**
- ✓ PUBLIC HEARING/COMMENTS**
- ✓ RESPONSE TO COMMENTS**
- ✓ RULE ADOPTION**



# SOIL REMEDIATION STANDARDS CONTAMINANT LIST

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## ✓ LIST OF CONTAMINANTS

- ▶ COMBINATION OF USEPA PRIORITY POLLUTANT LIST AND USEPA CONTRACT LABORATORY TCL/TAL LIST
- ▶ ADDITION OF OTHER CONTAMINANTS OF CONCERN (BASED ON DEP PROGRAM NEEDS)
- ▶ DELETION OF COMPOUNDS/ELEMENTS (BASED ON ANALYTICAL CONCERNS, TOXICOLOGICAL INFORMATION, CONSOLIDATION OF ISOMERS)
- ▶ RESULTS IN 145 CONTAMINANTS

# SOIL REMEDIATION STANDARDS TOXICITY FACTOR HIERARCHY

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## ✓ TOXICITY FACTOR SOURCES/HIERARCHY

- ▶ DEP - A-280
- ▶ EPA - IRIS
- ▶ OTHER SOURCES - INCLUDING
  - EPA - HEAST
  - EPA - NCEA
  - DEP - NON A-280
  - CALIFORNIA EPA

# **SOIL REMEDIATION STANDARDS TREATMENT OF CLASS “C” CONTAMINANTS**

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## **✓ EPA WEIGHT OF EVIDENCE CLASSIFICATION SYSTEM FOR CARCINOGENICITY**

- ▶ A - HUMAN CARCINOGEN**
- ▶ B - PROBABLE HUMAN CARCINOGEN**
- ▶ C - POSSIBLE HUMAN CARCINOGEN**
- ▶ D - NOT CLASSIFIABLE AS TO HUMAN  
CARCINOGENICITY**
- ▶ E - EVIDENCE OF NONCARCINOGENICITY FOR  
HUMANS**

# **SOIL REMEDIATION STANDARDS TREATMENT OF CLASS “C” CONTAMINANTS**

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## **USEPA WATER PROGRAMS**

- ✓ CONTAMINANT TREATED AS A NONCARCINOGEN AT HQ = 0.1
- ✓ IF NO NONCARCINOGEN TOX DATA AVAILABLE, CONTAMINANT TREATED AS A CARCINOGEN AT 1 X 10<sup>-5</sup> RISK LEVEL

## **USEPA SUPERFUND PROGRAM**

- ✓ CONTAMINANT TREATED AS A CARCINOGEN AT 1 X 10<sup>-6</sup> RISK LEVEL
- ✓ IF NO CARCINOGEN TOX DATA AVAILABLE, CONTAMINANT TREATED AS A NONCARCINOGEN AT HQ = 1

# **SOIL REMEDIATION STANDARDS TREATMENT OF CLASS “C” CONTAMINANTS**

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## **✓ DEP CLASS “C” CONTAMINANT POLICY**

- ▶ TREAT CONTAMINANT AS A CARCINOGEN AT A 1 X 10-6 RISK LEVEL (WITH DSRT REVIEW OF TOXICOLOGICAL DATA)**
- ▶ IF NO CARCINOGEN TOXICOLOGICAL DATA ARE AVAILABLE, TREAT CONTAMINANT AS A NONCARCINOGEN AT HQ = 0.1**

# SOIL REMEDIATION STANDARDS

## REPORTING OF NUMERIC STANDARDS

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- ✓ ALL NUMERIC STANDARDS ARE EXPRESSED AS mg/kg (PPM)
- ✓ STANDARDS LESS THAN 10 mg/kg ARE ROUNDED TO 1 SIGNIFICANT FIGURE
- ✓ STANDARDS GREATER THAN OR EQUAL TO 10 mg/kg ARE ROUNDED TO 2 SIGNIFICANT FIGURES
- ✓ A CONVENTIONAL ROUNDING PROTOCOL WAS EMPLOYED.

# **SOIL REMEDIATION STANDARDS GENERAL ASSUMPTIONS**

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- ✓ USE OF USEPA MODELS TO THE GREATEST  
EXTENT PRACTICABLE**
- ✓ USE OF USEPA “DEFAULT” PARAMETERS  
(MAJOR EXCEPTION - USE OF NEW JERSEY  
VALUES OVER NATIONAL VALUES)**

# SOIL REMEDIATION STANDARDS

## DEVELOPMENT OF STANDARDS

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### ✓ LAND USE SCENARIOS

- ▶ RESIDENTIAL
- ▶ NON-RESIDENTIAL (OUTSIDE WORKER)

### ✓ STANDARDS FOR OTHER NON-RESIDENTIAL SCENARIOS CAN BE DEVELOPED ON A CASE SPECIFIC BASIS



# SOIL REMEDIATION STANDARDS

## DEVELOPMENT OF STANDARDS

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### ✓ EXPOSURE PATHWAYS

- ▶ INGESTION - DERMAL
- ▶ INHALATION
- ▶ IMPACT TO GROUND WATER
- ▶ ALLERGIC CONTACT DERMATITIS (HEXAVALENT CHROMIUM) (Currently under review by the Chromium Workgroup)

# **SOIL REMEDIATION STANDARDS**

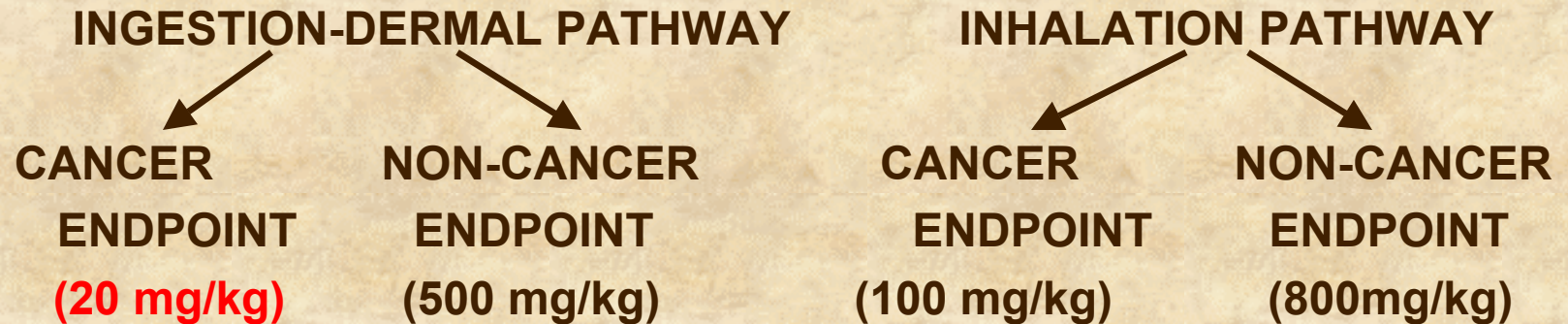
## **DEVELOPMENT OF STANDARDS**

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- ✓ **USE THE TOXICITY FACTOR HIERARCHY FOR THE INGESTION-DERMAL AND INHALATION PATHWAYS**
- ✓ **CALCULATE A SOIL REMEDIATION VALUE FOR BOTH CANCER AND NON-CANCER HEALTH ENDPOINTS**
- ✓ **LOWEST DERIVED VALUE BECOMES THE STANDARD FOR THE GIVEN CONTAMINANT**

# SOIL REMEDIATION STANDARDS

## DEVELOPMENT OF STANDARDS



**SOIL REMEDIATION STANDARD IS THE LOWEST  
CALCULATED CONCENTRATION**

# SOIL REMEDIATION STANDARDS

## PRACTICAL QUANTITATION LEVELS

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- ✓ HEALTH BASED CRITERIA MUST BE COMPARED AGAINST ANALYTICAL QUANTITATION LIMITS
- ✓ ANALYTICAL LIMIT USED IS THE PRACTICAL QUANTITATION LEVEL (PQL)
- ✓ PQLs WERE DETERMINED FOR FOR EACH CONTAMINANT WERE TO BE BASED ON THE FOLLOWING:
  - ▶ MULTIPLYING ACTUAL LABORATORY METHOD DETECTION LIMITS (MDLs) OR METHOD ESTIMATED MDLs BY 10 (ORGANICS)
  - ▶ USE OF EPA CLP CONTRACT REQUIRED QUANTITATION LIMITS (METALS)
- ✓ IF HEALTH BASED CONCENTRATION IS LESS THAN THE PQL, THE STANDARD IS SET AT THE PQL

# SOIL REMEDIATION STANDARDS

## INTERIM SPECIFIC STANDARDS

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### ✓ INTERIM SPECIFIC STANDARDS

- ▶ STANDARDS FOR OTHER CONTAMINANTS CAN BE DEVELOPED ON A CASE SPECIFIC BASIS
- ▶ EXISTING STANDARDS CAN BE MODIFIED BASED ON NEW SCIENTIFIC INFORMATION

# **SOIL REMEDIATION STANDARDS DEVELOPMENT OF ALTERNATIVE REMEDiation STANDARDS**

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- ✓ PROVIDED FOR IN THE BROWNFIELDS ACT  
(NJSA 58:10B12f)**
- ✓ THREE LEVELS OR TIERS**
  - ▶ SOIL REMEDIATION STANDARDS USING DEFAULT ASSUMPTIONS**
  - ▶ ALTERNATIVE REMEDIATION STANDARDS USING SITE SPECIFIC VALUES IN LIEU OF DEFAULT ASSUMPTIONS**
  - ▶ ALTERNATIVE REMEDIATION STANDARDS DERIVED FROM USE OF DIFFERENT MODELS**

# **SOIL REMEDIATION STANDARDS DEVELOPMENT OF ALTERNATIVE REMEDiation STANDARDS**

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- ✓ BURDEN OF PROOF OF THE PROTECTIVENESS OF THE ARS LIES WITH THE PERSON PROPOSING THE ARS**
- ✓ THE DEPARTMENT CAN DEVELOP / IMPLEMENT AN ARS**
- ✓ AN ARS CAN BE LOWER THAN THE PROMULGATED STANDARD**

# SOIL REMEDIATION STANDARDS BACKGROUND

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- ✓ **BROWNFIELD ACT PRECLUDES THE DEPARTMENT FROM REQUIRING REMEDIATION BEYOND REGIONAL NATURAL BACKGROUND LEVELS FOR ANY CONTAMINANT (NJSA 58:10B-12g(4))**
- ✓ **BROWNFIELD ACTS REQUIRES THE DEPARTMENT TO DEVELOP REGULATIONS THAT SET FOR A PROCESS TO IDENTIFY BACKGROUND LEVELS.**
  - ▶ **THIS PROCESS IS CONTAINED IN THE TECHNICAL REQUIREMENTS FOR SITE REMEDIATION (NJAC 7:263-3.10)**



# SOIL REMEDIATION STANDARDS BACKGROUND

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- ✓ IF HEALTH BASED CONCENTRATION IS LESS THAN “BACKGROUND”, THE SITE SPECIFIC STANDARD WILL BE SET AT BACKGROUND

# SOIL REMEDIATION STANDARDS BACKGROUND

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## ✓ PROBLEM

▶ WHAT SHOULD BE DONE FOR THOSE CONTAMINANTS WHOSE HEALTH BASED CRITERION IS AT OR BELOW “NATURAL” BACKGROUND LEVELS?

- CONDUCT A SITE SPECIFIC BACKGROUND DETERMINATION
- PROMULGATE A STANDARD BASED ON NATURAL BACKGROUND.

## ✓ ONLY ONE CONTAMINANT EFFECTED

▶ ARSENIC

# SOIL REMEDIATION STANDARDS BACKGROUND

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- ✓ **ESTABLISHMENT OF A BACKGROUND VALUE FOR ARSENIC - BALANCING ACT**
- ✓ **NEED TO REDUCE UNNECESSARY BACKGROUND DETERMINATIONS (WORKLOAD ISSUE)**
- ✓ **NEED TO MINIMIZE “FALSE NEGATIVES” (LUMPING DISCHARGES INTO BACKGROUND)**

# SOIL REMEDIATION STANDARDS BACKGROUND

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## ✓ DATA SOURCE: SANDERS (2003)

- ▶ DETERMINATION OF BACKGROUND LEVELS OF METALS
- ▶ 248 SAMPLES COLLECTED IN AREAS NOT IMPACTED BY LOCAL DISCHARGES
- ▶ SAMPLES COLLECTED IN THE 4 GEOGRAPHIC REGIONS OF THE STATE
- ▶ SAMPLES COLLECTED IN URBAN AND NONURBAN AREAS

# SOIL REMEDIATION STANDARDS BACKGROUND

## SANDERS STUDY

### Arsenic results - All studies (mg/kg)

<i>Location</i>	<i>Samples</i>	<i>Median</i>	<i>75th percentile</i>	<i>95th percentile</i>	<i>Maximum</i>
<i>Piedmont -Urban</i>	67	5.20	12.40	29.45	49.70
<i>Ridge and Valley - Rural</i>	23	4.90	5.45	7.67	9.90
<i>Highlands - Rural</i>	23	4.80	7.75	9.98	10.30
<i>Coastal Plain - All</i>	135	3.90	7.20	14.49	83.10
<i>Coastal Plain - Urban</i>	91	5.40	9.25	15.35	83.10
<i>Coastal Plain - Rural</i>	44	1.15	2.45	9.14	14.40
<i>All Areas</i>	248	4.70	7.43	18.87	83.10

# SOIL REMEDIATION STANDARDS BACKGROUND

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- ✓ **SELECTED THE LOWEST REGIONAL 95TH PERCENTILE VALUE AS AN APPROPRIATE VALUE FOR ARSENIC BACKGROUND**
  - ▶ **8 MG/KG**
  
- ✓ **CONDUCTED A “REALITY CHECK” USING SITE DATA FROM EDSA**
  - ▶ **DATA SET - ALL VALUES  $\leq$  20 MG/KG**
  - ▶ **INCLUDES “CLEAN” AND “DIRTY” SAMPLES**

# SOIL REMEDIATION STANDARDS BACKGROUND

ARSENIC VALUES (MG/KG)					
EDSA DATA <=20 MG/KG					
SANDERS STUDY (ALL DATA)					
REGION	n	MEDIAN		75TH PERCENTILE	
Coastal Plain	4718	7.5	3.9	13.5	7.2
Piedmont	6610	3.5	5.2	7.5	12.4
Highlands	414	4.5	4.8	8.5	7.8
Ridge and Valley	259	5.5	4.9	6.5	5.4
All areas	12001	4.5	4.7	8.5	7.4